WeatherTRAK®
The proven leader in smart irrigation.

How to Achieve Maximum Water Savings through Smart Irrigation Conservation Programs

Maintenance-free ET Delivers Sustained Landscape Water Efficiency and Lowers True Cost of Ownership

A WHITE PAPER

By Tom Ash
Director of Conservation Alliances
HydroPoint Data Systems, Inc.
Author of *Landscape Management for Water Savings* (USBR, 1997); *What to Do Before, During and After a Drought* (National Landscape Association, 2004); Advisor to the National Water Commission of Australia (2006)

WeatherTRAK®
The proven leader in smart irrigation.

Introduction

A 1999 *Kiplinger Letter* to industry warned that managing the quality and quantity of worldwide water supplies would "constantly get tougher" on government, business and end users. Describing challenges that the U.S. would face, the report predicted "costly government regulations" and that "cost and availability issues [will] ripple though the national economy."

Ensuring the availability of quality water becomes more and more difficult as our population increases and the climate changes. From 1990 to 2000, several Sunbelt cities grew 40 percent.[1] In 2005 alone, California grew by 444,000 residents to total nearly 37.2 million.[2] The U.S. General Accounting Office estimates that 36 states will face water shortages by 2010 even with average precipitation.[3] Below average precipitation will lead to crisis.

None of this is news to water purveyors. The question is what will we do about it?

Water supply studies and population growth statistics have already prompted agencies to create water master plans, search for new water supplies, increase conservation efforts and even limit growth. These programs led directly to water rate hikes, usage regulations and new or increased service hook-up fees, because the cost for infrastructure improvements intended to extend supply is astronomical–at least $280 billion, according to EPA estimates. But these measures have not instilled the water efficiency practices that will allow us to meet future water demand at a lower cost. To protect water supplies and local environments, we need to make every home and business efficient.

Making progress with low-flow plumbing

As predicted by Kiplinger, federal law now requires low-flow plumbing devices for new development. These devices are making a measurable difference. For example, Los Angeles saw a 25 percent decrease in demand in the 1990s with a plumbing retrofit program funded by water agencies. Plumbing conservation is widely accepted and routinely called for in federal, state and local legislation, ordinances for new development and agency rebate programs.

The major benefit of low-flow plumbing device programs is that they can be implemented without requiring a change in the behavior of end users. Saving water indoors with low-flow plumbing is *easy* compared to controlling outdoor water waste. Yet the vast majority of household water flows outside. A study conducted by the American Water Works Association (AWWA) shows that 58 percent of residential water is applied to landscapes.[4] Gardening, recognized as the number one outdoor leisure activity, is growing in popularity as a national pastime.[5] According to a report published in the journal *Environmental Management*, some 40 million acres of the U.S. are covered in lawns, making turf the nation's most irrigated crop.

---

[1] Arizona Department of Water Resources
[2] California Department of Finance
[3] GAO, 2002
[4] American Water Works Association, End Uses of Water Study, 1999
[5] Harris Poll, 1998

To date, very few landscape water conservation programs have been successful in returning consistent savings without significant ongoing support from agencies, landscape professionals, homeowners or all three. That leaves landscapes, the largest non-agricultural consumer of water, as one of the most inefficient users of water, with the most significant potential for conservation.

Paying the high costs of outdoor overwatering

Most landscapes are significantly overwatered. Doug Bennett of Southern Nevada Water Authority (SNWA) estimates that as much as 50 percent of landscape water could be conserved in his region. In southern California, Irvine Ranch Water District succeeded in reducing commercial landscape water use by 58 percent through outdoor water conservation programs launched in 1991. A 2005 University of Florida study led by Dr. Michael Dukes measured landscape waste as high as 82 percent.

The widespread practice of overwatering has sky-high costs for communities, businesses and landowners. End users pay more for water in the form of higher rates, and landowners spend millions of dollars repairing damage caused by landscape overwatering and runoff. The California Insurance Association reported nearly $500 million dollars for insurance claims due to water damages in 2005, and blames outdoor water use for 75 percent of claims.

Property owners spend millions of dollars annually repairing damage caused by overwatering landscapes.

The high price paid for overwatering landscapes also includes our personal and environmental health. Water runoff from overwatered landscapes is the culprit behind non-point source water pollution. Pollutants running off overwatered landscapes include nitrates, phosphates, pesticides, herbicides and bacteria. Beachgoers, surfers and swimmers report

increased illnesses due to polluted waters[6] and sensitive local habitat is vulnerable to water runoff pollution.[7]

Along with heightened awareness of the dangers of landscape overwatering comes more regulation to control runoff and water waste. These regulations further drive up the costs of water, development and environmental clean-up. Overwatered landscapes are a financial drain on both the water agency and individual ratepayers.

Automating water waste

Numerous studies have shown that nearly everyone overwaters, from homeowners to landscape professionals. Why? Scheduling irrigation requires complex scientific equations that must be calculated for every irrigation station on a site, and repeated daily as local weather changes. Accurately setting and adjusting irrigation schedules is difficult and time-consuming for the average user and landscape professional. Added to that, most people mistakenly believe that more water is better for landscapes.

Facing barriers to conservation

Contractors are doing their best to conserve water, but until recently, they haven't had the tools to make this possible. The overwhelming evidence from water agencies is that ordinary irrigation devices and systems do not come close to applying water efficiently to landscapes. Typical irrigation controllers apply the amount of water that landscapers or homeowners set into timers. Residential water studies conducted by the AWWA reveal that homes with automatic irrigation controllers use 47 percent more water than landscapes actually need. Clearly, ordinary or traditional irrigation controllers or, in industry parlance, "dumb controllers," contribute to the systemic overwatering of landscapes.

Science Saves Water

250 landscape contractors were asked what irrigation schedules they would set given the following parameters: **ET of 1 inch, cool season turf, full sun, gentle slope, spray irrigation and clay soil**. The contractors developed the following schedule:

- **7-20 minutes**
- 4 days/week
- 1 cycle

We get a measurably different result with scientific scheduling based on Irrigation Association protocol:

- **4.2 minutes**
- 2 days/week
- 3 cycles

The scientifically calculated schedule saves up to 70 percent of water used in the schedule created by contractors and avoids water runoff.

Determining how much water a landscape actually needs

In the early 1990s, a group of scientists seeking to automate efficient landscape water usage looked to two tenets of agricultural and horticultural science: first, the applicability of evapotranspiration (ET) to plant water need; second, the varied water needs of different plant types. Weather dictates how much water a given plant needs each day, which is why the measurement of ET is central to achieving water efficiency. Additionally, plants have remarkably varied water needs. These differences,

[6] Surfrider Foundation
[7] Environmental Protection Agency

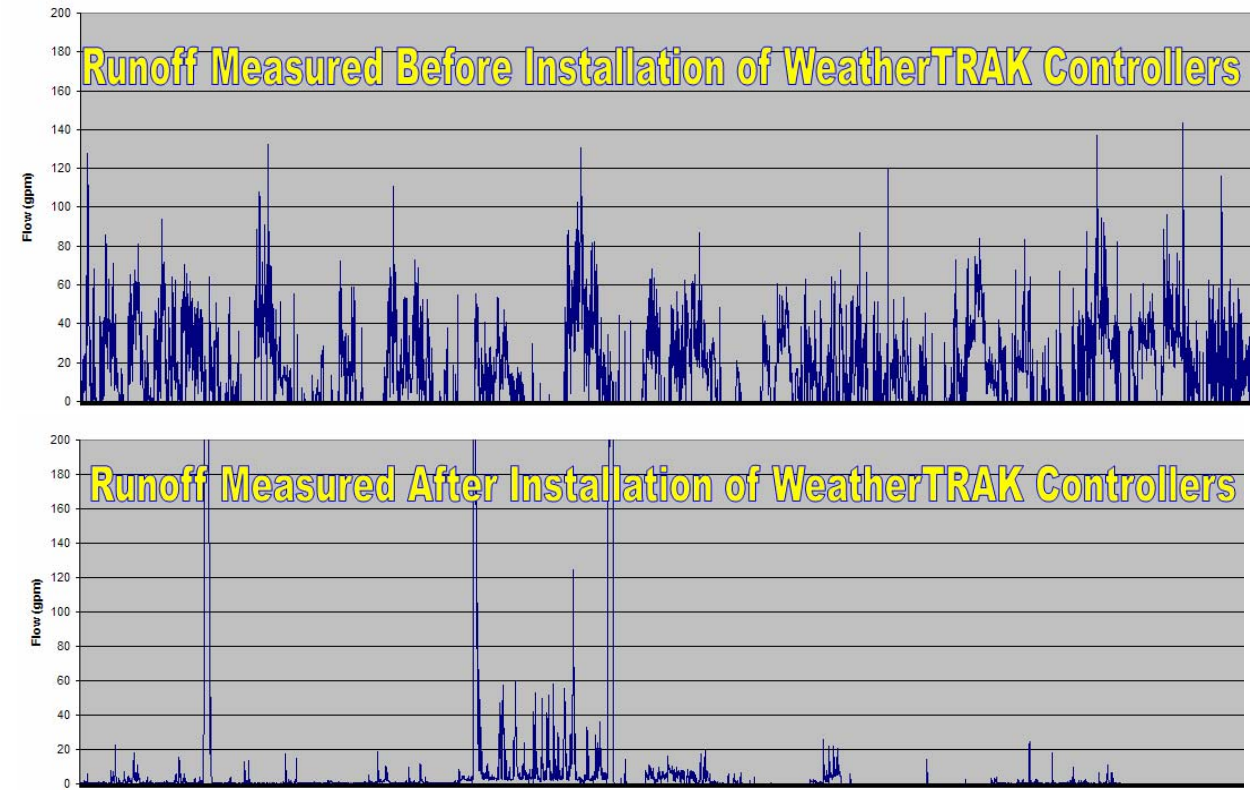
noted with crop coefficients (Kc), are used to calculate individual plant water need in relation to ET. Achieving landscape water efficiency requires the application of scientific standards for calculating ET and crop coefficients as well as the use of high efficiency irrigation systems.

Testing the first smart controllers

In 1997, the first smart controllers for non-agricultural use were put to the test by public agencies. Metropolitan Water District of Southern California (MWD) and Irvine Ranch Water District (IRWD) designed and funded a study to determine if ET could be sent to controllers in homes and adjust schedules automatically – all in the name of providing optimal care to plants while maximizing water conservation.

This first test proved a success. Average water-use homes with small landscapes saved 16-to-25 percent of outdoor water, improved landscape health and achieved 97 percent customer satisfaction. This study helped foster new thinking about the prospect of achieving widespread landscape water efficiency through automation.

A second major study was designed to determine if the same smart controller installed into both residential and commercial sites could reduce urban runoff pollution. This three-year study measured a 64-to-71 percent reduction in runoff with WeatherTRAK smart controller technology.



WeatherTRAK reduced urban runoff by up to 71 percent, Cal/EPA, 2002.

WeatherTRAK®
The proven leader in smart irrigation.

Separating fact from fiction
Eighteen subsequent public agency studies involving WeatherTRAK technology, conducted in different climates with different approaches, achieved consistent results: healthy plants, water savings and reduced runoff. Study participants frequently comment on the controller's convenience and appreciate "not having to worry about over- or under-watering."

By 2002, severe drought had hit the western U.S. again, prompting public agencies to process grant applications for ET controller rebates. Attracted by public agency subsidies, manufacturers rolled out new products touted as ET controllers to qualify for rebates. They advertised bold claims, such as "Reduces water use by 50%," "Reduces water runoff" or "Set it and forget it." But their claims were unsubstantiated by independent study. Public agency rebate programs for ET controllers drove irrigation manufacturers to bring products to market quickly, but without any proof that they actually worked.

On the other hand, seeking to continually improve their technology, the scientists behind WeatherTRAK encouraged public agencies to test their products methodically and report their findings at water conferences and landscape industry events. The results of these independent studies are summarized in the following table:

Summary of Independent WeatherTRAK Studies, from 1998 to Present

Study Name	Product(s) Tested	Objective	Key Findings
Irvine Ranch Water District (IRWD)/ Metropolitan Water District (MWD), 1998	WeatherTRAK – enabled (daily ET, scheduling engine)	Test performance of auto ET and scheduling	16%-25% water savings; 97% customer satisfaction; plant appearance improved; water bills reduced
Los Angeles Department of Water and Power (LADWP), 2003	WeatherTRAK-enabled and Water2Save (managed schedules)	Compare performance on commercial sites	WeatherTRAK sets benchmark of 95% of conservation potential realized
Santa Barbara County and Partners, 2001	WeatherTRAK-enabled	Test water savings	26%-59% savings; customer service support noted by agency
California Environmental Protection Agency (Cal/EPA), 2002	WeatherTRAK-enabled	Test runoff reduction and water savings	71% runoff reduction; 22% savings; 71% reduction in mass loading of pollutants from urban runoff
Los Angeles Department of Water and Power (LADWP), 2004	WeatherTRAK-enabled	Test installation and savings in 500 homes	40% average savings to date
University of Nevada, Reno (UNR), 2003	WeatherTRAK-enabled	Compare automated watering to expert, restrictions and landscaper	27% savings compared to landscaper; better plants compared to restrictions
Boulder, Colorado, 2002	WeatherTRAK	Test water savings	Up to 59%

University of Nevada, Las Vegas (UNLV), 2006	WeatherTRAK-enabled	Savings between 20%-31% and good plant health	Due summer 2006; UNLV staff recommends the product
University of Arizona, ongoing	WeatherTRAK-enabled, soil moisture sensor, sensor controller	Test water savings	Due 2007
Metropolitan Water District, 2004	WeatherTRAK-enabled, AquaConserve (historical ET), WeatherSet (solar gauge)	Compare water use	WeatherTRAK watered at plant efficiency; historical product over- and under-watered; solar product over-watered
Colorado State University, 2003	WeatherTRAK-enabled	Determine plant use (Kc)	Only WeatherTRAK was able to water to ET levels for testing plants
Soquel Creek Water District, 2005	WeatherTRAK-enabled	Test water savings	19% savings; prompted agency to establish a program for commercial and residential landscapes
Newhall County Water District, 2005	WeatherTRAK-enabled	Test water savings	Averaged 40,000 gallons saved per home
University of Georgia, ongoing	WeatherTRAK-enabled	Test water savings and plant health	Due 2007
Irrigation Association – Smart Water Application Technology smart controller performance protocol, 2005	WeatherTRAK-enabled	Test of irrigation adequacy, excess and additional key performance attributes	WeatherTRAK-enabled controllers receive first perfect scores on all components of the protocol; expected to form the basis of California legislation and smart controller rebate programs
City of Bend, OR, 2004-2005	WeatherTRAK-enabled	Test water savings and plant health	41% savings on city-maintained landscapes
Victor Valley Water District, 2004-2005	WeatherTRAK-enabled	Test water savings and plant health	Demonstrated savings and plant health; led to Soquel Creek Water District rebate program
Santa Clara Valley Water District, 2004-ongoing	WeatherTRAK-enabled, AquaConserve	Test water savings and plant health	Led to weather-based irrigation controller program

More information about smart controller studies is available online:

- www.cuwcc.org, the California Urban Water Conservation Council Web site
- www.modernwater.blogspot.com, blog covering smart water management issues

Formalizing standards for smart irrigation controllers

To ensure that water customers get what they expect and pay for from ET controllers, a consortium of water agencies and the Irrigation Association developed a comprehensive

smart controller performance protocol called SWAT™, for Smart Water Application Technology™. The protocol is accessible at www.irrigation.org.

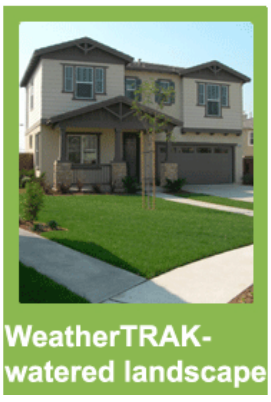
Intended to provide a uniform measurement of smart controller performance, the SWAT protocol has been available since 2004. Only four products marketed as smart controllers have reported SWAT results to date. Three of the four SWAT-evaluated products use WeatherTRAK technology. These WeatherTRAK-enabled controllers are the first and only products to receive perfect scores on all components of the SWAT performance protocol.

A SWAT performance report is a requirement for a growing number of agency-sponsored smart controller rebate and voucher programs, including those of MWD, the nation's largest water district, and East Bay Municipal Utility District. The SWAT performance report is the first universal standard agencies can apply in promoting landscape efficiency devices to customers and the landscape industry.

Measuring the IQ of smart controllers
Manufacturers employ four primary methods for calculating the correct irrigation schedule for a specific landscape and for varying the schedule based on ET: 1) historical ET; 2) single-sensor gauge; 3) daily ET with a single, fixed weather station source; and 4) daily ET with no geographical barrier. Lacking SWAT reports for two-thirds of these products, we'll look to other public agency tests and the practical experience of landscape professionals in evaluating each of these methods:

Historical ET
Promoted as simple and inexpensive, these controllers create irrigation schedules based on an embedded historical ET curve and user programming. Historical ET controllers have had very mixed results in limited public agency studies, sometimes overwatering and sometimes underwatering. In some cases, agencies testing historical controllers have seen water bills increase or they have removed the controllers from study sites due to high water use. The only successful studies involving historical controllers were developed by their manufacturer.


Over-watered landscape


WeatherTRAK-watered landscape

A side-by-side comparison of two communities:[8]

Average water use for 3-month period:
- Community using WeatherTRAK = .27 gallons/ sq ft/day (11 CCFs/month)
- Community using historical ET controller = .90 gallons/sq ft/day (36 CCFs/month)

The community using historical ET controllers used 333 percent of the water used by the WeatherTRAK community. Tiered rate structures further increase homeowners' water bills.

[8] Eastern Municipal Water District

Why can't historical ET controllers reliably achieve landscape water efficiency? First, weather is not the same from year to year. To complicate matters, there is little historical ET data available for most communities in the U.S. The historical ET curves placed in these controllers represent the manufacturers' best guesses about past weather conditions, with little hope of matching today's weather conditions (ET) and plant water need. A review of CIMIS and NOAA weather station data shows that ET can vary up to 225 percent for a single day when comparing the current day to the ET from the same day last year or the year before. Historical ET, therefore, is an inaccurate guide for today's ET for any given location.

Historical ET controllers have received mixed reviews from public agency studies, which reveal both over- and under-watering. Additionally, none of these products has published SWAT performance reports.

Single-sensor gauge

Manufacturers applying the single-sensor gauge method of monitoring weather changes claim that a single-sensor gauge, measuring either temperature or solar radiation, can closely mimic daily ET. But single sensors are not used by universities or the agricultural industry because these devices are incapable of measuring all ET variables required for the Penman-Monteith method (recommended by the Irrigation Association and applied by major agricultural institutions): solar radiation, wind speed, temperature and relative humidity. Additionally, a site may require multiple sensors because conditions often vary from zone to zone, based on variables such as tree shade and seasonal sun patterns, either of which would greatly affect data gathered by a solar gauge sensor.

Sensors have been available to the landscape industry for many years but have not been embraced because of their reputation for inconsistent performance and maintenance needs. According to the user manuals of these products, sensors require regular battery replacement and monthly servicing, making their true cost of ownership much higher than manufacturers' advertised prices. Given these issues and others, such as the risk of vandalism and accidental displacement, a single-sensor gauge presents a vulnerable single point of failure for the entire irrigation system, jeopardizing customer confidence and the prospect of sustained landscape water efficiency.

Single-sensor controllers have received mixed reviews from a few public agency studies, and they offer no published SWAT performance reports for public review.

ET from a single, fixed weather station source

A common method for obtaining local ET data is to use a fixed ET weather station. A fixed weather station using the Penman-Monteith equation to calculate ET from the local solar radiation, wind, temperature and humidity measurements provides an accurate daily ET number for that specific location. However, there are several drawbacks to this method, including:

1. ET changes as you travel farther from the fixed station.
2. Fixed weather stations are expensive to locate and install – a site must be an open field without buildings, roads, trees or other obstacles that block wind or create shade.

3. Regular calibration and maintenance of stations must be performed to ensure ongoing accurate data.

> 70 of CIMIS's 201 weather stations were listed as inactive as of May 31, 2006.
>
> Source: CIMIS web site

Even with consistent maintenance, weather stations record missed or erroneous data. Currently 70 California Irrigation Management Information System (CIMIS) ET stations, or 35 percent of the total CIMIS network, are "inactive" or do not return accurate daily ET.

If homes and landscapes are located close to existing weather stations, the ET measured by fixed weather stations can be considered accurate. However, the further the distance from an active ET weather station, the less accurate the ET will be. Products that rely on existing ET stations are also limited to those states or locations where government actively maintains ET data. California is the only state with a coordinated weather station system, CIMIS. The limited number of ET stations limits the viability of products using this weather data method.

There are two other factors that make a single-source ET product more costly and less effective than alternatives. First, a phone line is typically required to run to the controller as a means to send and receive ET data. This significantly increases the cost and complexity of the installation. It also increases the cost of ongoing data transmission because phone line charges are incurred. The effectiveness of these products is also limited by the need for users to calculate accurate irrigation schedules, already shown to be a weakness in controller design.

Products using single weather stations as a data source have no published public agency studies validating manufacturers' claims. Single weather station source products have one SWAT performance report for public review. See the Irrigation Association web site at www.irrigation.org.

Maintenance-free ET

The most tested and proven smart controller technology uses weather data that is culled from a variety of sources, calculated using the recognized Penman-Monteith ET equation, checked and modeled for accuracy, and transmitted to smart controllers installed in the field anywhere in the U.S. and Canada. The service, called ET Everywhere™, provides ET data to WeatherTRAK®-enabled controllers from HydroPoint, The Toro Company and Irritrol. ET Everywhere draws data from 17,000 weather stations, including the National Oceanic and Atmospheric Administration (NOAA), CIMIS and MesoNet. The Penman-Monteith equation and the MM5 modeling technique[9] are used to determine accurate local ET values. The ET values delivered by the ET Everywhere service achieve independently verified accuracy down to a "nanozone" level – an area less than one square kilometer (0.5 mile) for anywhere in the U.S. and Canada. The ET data is validated for accuracy ten times prior to its daily broadcast to WeatherTRAK-enabled controllers. The daily ET broadcast triggers automated irrigation scheduling adjustments based on actual weather conditions for each station on a receiving WeatherTRAK-enabled controller.

[9] MM5 is based on the fifth-generation Pennsylvania State University – National Center for Atmospheric Research Mesoscale Model, and is used by the Federal Agricultural Administration, military branches and other institutions.

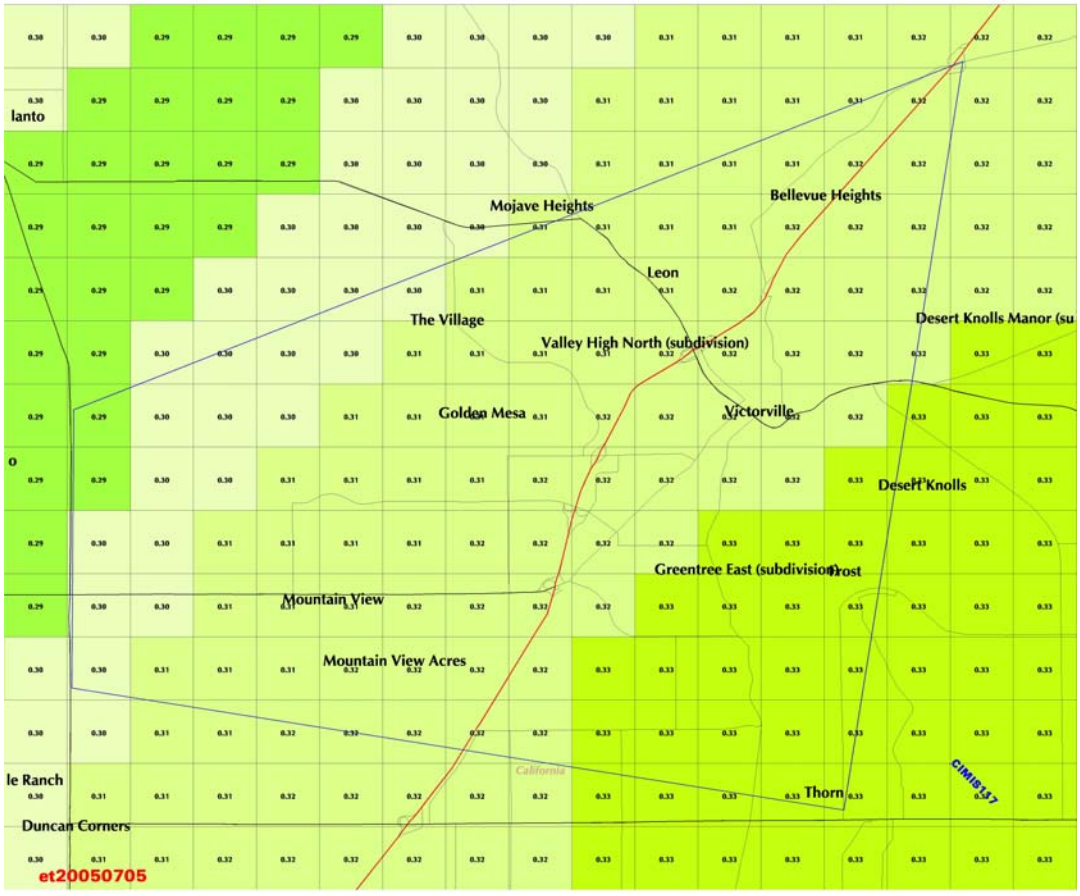
This accurate method of ET accumulation is *maintenance-free* for the end user, and this is key to its effectiveness. This method eliminates the costs to install new ET weather stations for agencies. It eliminates the risks of the single-sensor controller method. Further, it eliminates the need for customers or water agencies to maintain and calibrate large numbers of sensors at residential and commercial landscapes.

Maintenance-free ET from the WeatherTRAK ET Everywhere Service

Every day, the ET Everywhere service delivers local ET to each WeatherTRAK-enabled controller. This proven method of maintenance-free ET requires no action on the part of the user, yielding sustained landscape water efficiency. Benefits to agencies include:

- No new weather station infrastructure costs
- No monthly sensor maintenance required
- Accurate weather data for every neighborhood in your service area
- Lowest cost means of achieving accurate ET-based irrigation
- Available now

The image below depicts how ET values vary from one neighborhood to the next, necessitating watering adjustments:



Government-owned weather station networks, such as NOAA, receive routine maintenance to return accurate weather data for a variety of essential public and private needs. Controllers using the ET Everywhere service have more than 20 public agency studies that validate the accuracy and performance of the broadcasted weather data. Additionally, controllers using the ET Everywhere service have recorded the first perfect scores on both components of the SWAT protocol: 100 percent irrigation adequacy and 0 percent irrigation excess, or runoff.

Irrigating smart from the start

Maintenance-free ET is critical, but it doesn't work without smart scheduling. The Achilles heel of most irrigation controllers, whether they are traditional or weather-based products, is that they rely on guesswork. Calculating an efficient irrigation schedule is a daunting task for most anyone. Homeowners and landscapers must know plant crop coefficients, soil infiltration rates and water holding capacity, sprinkler precipitation rates, sprinkler uniformity, slope degree and hours of sun or shade on a landscape, multiplied by every irrigation zone. Controller users simply cannot be expected to possess the encyclopedic knowledge of horticulture and irrigation necessary to create accurate, zone-specific irrigation schedules, no matter how much they care about saving water. How do we know?

Despite public agency awareness campaigns designed to educate the public about low water use landscapes and water conservation, new homes use more water than existing homes, in comparisons of same-size lots across California.[10] Despite all the public agency money spent on promoting low-water-use landscapes and mandated low-flow plumbing devices, consumers use more water than ever.

Checklist for Creating an Efficient Irrigation Schedule:

- ✓ Daily ET data for the local microclimate
- ✓ Type of plants being irrigated
- ✓ Infiltration rate of water into the soil
- ✓ Plant root depth
- ✓ Maximum allowable soil moisture depletion
- ✓ Slope of the area being irrigated (to determine runoff potential and the optimal number of cycles for maximum efficiency)
- ✓ Sun or shade level of the area being irrigated
- ✓ Precipitation rate of the irrigation system
- ✓ Uniformity value of the irrigation system

Achieving landscape water efficiency requires a "smart from the start" approach. The controller must eliminate user guesswork with scheduling software that calculates an appropriate watering schedule. WeatherTRAK-enabled controllers include built-in Scheduling Engine™ software that automates the creation of base schedules for every irrigation station on a site. The scheduling calculations are based on practices recommended by the Irrigation Association and the Center for Irrigation Technology at California State University, Fresno. Starting with a controller that has an automated scheduling engine will achieve efficient irrigation from the first day the controller is activated.

[10] Sonoma County Water District and Contra Costa Water District

Ensuring landscape water efficiency with long-term customer service

Manufacturers of smart controller products can be divided into two categories; neither provides the service model that must accompany any successful solution. The first category is small cottage shops. With fewer than ten employees, these companies are incapable of offering enterprise-wide customer service or follow-up, and most make no pretense to do so. The other category encompasses larger companies that are thinly stretched to provide service for each of their fifty or more products. They cannot provide the high level of product support that results in a successful customer experience. Their smart controller customers feel inadequately supported and will not recommend the products to others. In reality, most irrigation manufacturers do not provide customer support because there is no financial incentive for them to do so. Their principal concern is selling more hardware, be it sensors or replacement parts, instead of offering services that would help customers make the most of the hardware they've already purchased.

As the newest and most high-profile component of an irrigation system, smart controllers are frequently the lightning rod for landscape- and irrigation-related issues regardless of their root cause. For example, a smart controller will typically apply less water than traditional controllers. This creates a string of occurrences for which water agencies and manufacturers are unprepared – namely, inefficient irrigation systems are "exposed" by truly smart irrigation controllers with a scientific scheduling engine. In contrast, controllers that require a user to program an initial schedule will tend to overwater and mask the deficiencies of an inefficient irrigation system. Even the world's smartest controller cannot compensate for or fix a poor irrigation system. If manufacturers are to protect water agencies from having to perform customer services, they must be able to fully support their products.

More than twenty public agency studies involving thousands of residential and commercial landscapes reveal just how much help contractors and homeowners need to identify and correct irrigation system inefficiencies. This service is not being provided by the irrigation or landscape industry. To protect agencies and contractors from the time and cost requirements of providing customer support, the WeatherTRAK smart irrigation solution includes toll-free phone- and email- based customer service, Monday through Saturday, in English and Spanish. Product training and additional support materials are available to users 24x7 on the WeatherTRAK web site. Continuous customer outreach in the form of follow-up calls, seasonal direct mailers, e-newsletters and field-based support helps to ensure that customers experience sustained water savings and plant health.

Recognizing the value of services

WeatherTRAK residential customers pay $48 per year for ongoing customer service and the ET Everywhere daily ET data broadcasts. At $4 per month, or $.13 per day, these services pay for themselves in water savings. Independent studies show that WeatherTRAK customers save far more on water bills than they are charged in service fees. To date, more than 95 percent of WeatherTRAK customers renew service for annual or multi-year terms. Customers renew because they recognize that ongoing service delivers water savings.

Experience with thousands of customers shows that the combination of a SWAT smart controller and a manufacturer's long-term customer service model results in more water savings and less polluted runoff. Benefits to your customers include:

- Healthier plants
- Convenience of maintenance-free ET
- Increased confidence about landscape watering
- Water saving solution that pays for itself
- Peace of mind when they're away from home
- Quick answers to questions because help is just a phone call away

HydroPoint now offers a professional services group contracted by customers seeking to maximize the water and cost savings that smart controllers can deliver. The professional services group is a network of company-employed or contracted field-based specialists who conduct pre- and post-installation site surveys to determine appropriate site water budgets and identify irrigation system inefficiencies. They help customers target savings objectives, based on current levels of water waste, and address any system inefficiencies that may impede their ability to save water. No irrigation manufacturer has ever taken water efficiency to this level of customer service.

Protecting consumers: what you don't know can hurt you

Third party testing, such as public agency studies, and certification, such as the SWAT performance protocol, help consumers make educated purchasing decisions and safeguard them from potential product hazards. At best, products that lack certification fail to consistently deliver accurate irrigation and optimal plant care. At worst, they put consumers at serious risk of fires caused by inadequate product safeguards. Like other consumer products, all irrigation controllers should be UL-certified, but many are not.[11] Rigorous product testing reflects a manufacturer's commitment to safety, product performance and durability. Uncertified products may be cheaper, but at what true cost?

Water agencies that qualify inadequately tested products for rebate programs or recommend them to end users by listing them on their web sites may be liable for house fires and other damages.

Maximizing savings with a complete and proven solution

A Truly Smart Controller Does the "Thinking" for Users

A controller worthy of the name "smart" calculates the most efficient irrigation schedules possible for optimal plant health and minimal runoff, and continuously modifies these schedules as local weather changes – without any need for human interaction.

Services are critical to the success of any technology, a fact that has been proven time and time again. That's why WeatherTRAK is now used across industries – by landscape professionals, homeowners, public agencies and *Fortune* 1000 companies – to address the full range of irrigation applications, from backyards to complex commercial landscapes. To date, HydroPoint has manufactured 42,000 controllers in its own facilities and in those of the company's strategic partner, The

[11] Underwriters Laboratories, Online Certifications Directory

Toro Company. HydroPoint is continually expanding production capacity to keep pace with customer demand for WeatherTRAK solutions.

Around the country, public agencies are irrigating their own properties with WeatherTRAK-enabled controllers. The City of Bend, Oregon first implemented smart controllers to "lessen the impact on our water resources – as well as decrease stormwater created by irrigation runoff," said Ric Olson, large landscape coordinator for the City of Bend.

City management also sought to set an example for the entire region by strictly adhering to landscape and irrigation standards while sustaining the quality appearance of landscaped areas.

Seeing the water savings WeatherTRAK controllers achieved, the City of Bend took the initiative a step further and now recommends that all new construction projects use irrigation controllers that have earned perfect scores on all components of the SWAT performance protocol. At present, only WeatherTRAK-enabled controllers from HydroPoint Data Systems, The Toro Company and Irritrol meet these criteria.

The SWAT protocol is likely to set the standard for irrigation devices sold in California; a new assembly bill requires that all controllers sold in the state be certified "smart" by 2010.[12] California is a legislative trendsetter; other states are expected to follow suit.

Promoting water efficiency to the landscape industry
Eliminating landscape water waste is the single largest opportunity for water agencies to increase the water supply without building costly new infrastructure and seeking out new sources of water. Water agencies need to implement actions that drive the landscape industry to be as water efficient as possible, or face the task of finding and supplying more water to meet customer demand.

Many water agencies are taking these measures to achieve sustained water efficiency:

- Requiring a 100 percent SWAT result for irrigation adequacy
- Requiring a 0 percent SWAT result for irrigation excess (runoff)
- Requiring irrigation systems to be at least 70 percent efficient (California Assembly Bill 2717 recommendation) and providing rebates or incentives, or requiring by ordinance that irrigation efficiencies are measured
- Requiring landscapers or landowners to measure the irrigated landscape area and to supply that data to customers and the water agency for public use in setting water budgets
- Requiring all landscape contractors to be licensed and trained in water efficient landscapes to conduct business in the community

[12] California Urban Water Conservation Council AB2717 Task Force

Measuring the true cost of a smart controller
Don't be fooled by the price tag of a manufacturer's hardware. A controller isn't smart just because it uses weather data. Not every company conducts rigorous quality assurance and third-party testing. When evaluating any smart controller product, ask these questions:

- Does the controller have peer-reviewed public agency studies that demonstrate water savings, runoff reduction and customer satisfaction?
- Is the controller UL-certified against electrical damages? If not, who will be liable for damages?
- Does the controller have a SWAT smart controller performance report?
- Who will answer customers' questions about the controller? Is toll-free, bilingual support available to end users?
- Who will train contractors to install the controller? Is online training available?
- How stable is the manufacturer? How many employees and what partners does the company have?
- How accurate is the weather data (ET) that is used by the controller?
- Does the controller offer maintenance-free ET? If not, who will monitor the day-to-day accuracy of ET data?
- Is the manufacturer equipped to meet the large-scale needs of a public agency program?
- What happens if an irrigation system is shown to be inefficient? Who will get the call and who will be able to help the customer? Is there a business model in place to handle customer service requests?

The true cost of ownership of a smart controller solution, and its true potential for success, are revealed in the answers to these questions.

Meeting water agency objectives for efficient landscape irrigation
The pressure is mounting against agencies in across the country to meet growing water demands while managing peaking and minimizing urban runoff pollution. By selecting and promoting the use of maintenance-free ET and SWAT-proven smart controllers, agencies achieve more efficient use of existing water supplies. An agency can achieve both widespread distribution and maximum landscape water efficiency through sensible program design.

The most successful programs make smart controllers: 1) readily accessible, 2) simple to install, 3) affordable and 4) reliable. How can an agency or city achieve widespread use of proven smart irrigation controllers and see irrigation system improvements by customers at the same time? Here are a few suggestions from agencies with successful programs:

- Place the cost of the technologies and service subscriptions on the water or utility bills to ensure long-term water efficiency.
- Provide a turn-key installation program for existing homeowners to achieve "smart from the start" operation.
- Provide a certified installer for existing commercial landscape customers.
- Enact ordinances to require that new developments include SWAT-evaluated smart controllers.

- Require that irrigation systems be checked for efficiency and upgraded to maintain water use efficiency.
- Offer incentives to customers who install smart controllers and maintain efficient irrigation systems.
- Offer incentives to builders who must install irrigation devices. This is the simplest and fastest route to customer adoption.
- Make rebate programs easy to understand and minimize paperwork. If the buyer perceives that the time and cost involved in completing paperwork outweigh the savings produced by the technology, nobody wins.
- Keep programs consistent over the long-term. It takes time for companies to add controller purchases to their procedures and budgets; frequent program changes can be problematic and frustrating to potential customers.

To learn more about how smart controller programs can achieve maximum water savings, contact Tom Ash at tash@hydropoint.com or 707.338.7031.

For more information about WeatherTRAK products and services, visit www.weathertrak.com.

About the Author

Tom Ash has over 20 years experience in water management and landscape education. A graduate of the ornamental horticulture program at California Polytechnic University at Pomona, Tom has served as a University of California Cooperative Extension Advisor and the Conservation Coordinator for Irvine Ranch Water District. He conducted the first studies of the water savings and runoff reduction capabilities of weather-based irrigation controllers. He has advised numerous agencies, including the National Drought Policy Commission, Utah Department of Water, Texas Nursery and Landscape Association, California Urban Water Conservation Council, Georgia Department of Environmental Protection, Colorado Green Industries, California Landscape Contractors Association, Metropolitan Water District of Southern California, New England Nursery and Landscape Association, New Mexico Drought Task Force, Southern Nevada Water Authority, Maui Water Department, and Atlanta Regional Planning Commission. Tom authored *Landscape Management for Water Savings*, published by the U.S. Bureau of Reclamation, and recently completed a drought preparedness training manual for the Nursery and Landscape Association Executives. Tom, Director of Conservation Alliances for Petaluma, CA-based HydroPoint Data Systems, Inc., resides with his family in Newport Beach, CA.